

## CLONETS-DS INTRODUCTION

The CLONETS-DS (Clock Network Services – Design Study) project aims to establish a pan-European time and frequency reference system as a European Research Infrastructure to serve the European science community. It is based on transmitting ultra precise time and frequency information via optical fiber. The proposed project builds on several joint European projects and its direct precursor project CLONETS. We now go far beyond previous efforts by designing a sustainable, pan-European, ultra-precise time-and-frequency reference-system available to the European research community. This Research Infrastructure considers user needs, designs the required architecture, engineering models and roadmaps, and develops a sustainability model for the future service, thus strengthening the European research area.

## METTING IN BAD HONNEF

The workshop took place at Physikzentrum Bad Honnef in Bonn between 13 and 15 September. Dozens of participants attended the workshop. The first two days were allocated to introduction for stakeholders and the analysis of science cases with stakeholders assistance. The last day was allocated for presentation to ESFRI Delegates.



*Plenary session*



The eight science cases that were identified by the CLONETS-DS project as needing precise time and frequency signals were briefly presented:

- Fundamental Science – by Dr. Ronald Holzwarth (Menlo Systems, Germany)
- Quantum Technology – by Dr. Cecilia Clivati (INRIM, Italy)
- Optical clocks and SI units – by Dr. Harald Schnatz (PTB, Germany)
- Geodesy – by Simon Stellmer (University of Bonn, Germany)
- Astronomy – by Philip Tuckey (Observatoire de Paris, France)
- Navigation and GNSS – by Urs Hugentobler (Technical University of Munich, Germany)
- Next Generation Telecom Networks – by Łukasz Śliwczyński (AGH, Poland, via video conference)
- Dissemination of reference frequencies to the general scientific community – by Vladimír Smoltacha (CESNET, Czech Republic)

Discussions with experts brought interesting results, which will be presented on summary of workpackage 1.

During day two participants were invited to show posters during the poster session.



*Poster session*

The day three was dedicated to presentations and discussion with ESFRI delegates. The three ESFRI delegates from Czech Republic, France and Germany were introduced. Discussion about a time and frequency network and its benefits on the national level should be enforced. Preparation of national parts of the infrastructure for national roadmaps for different scenarios should be considered by the CLONETS-DS consortium. The delegates also recommended that strong emphasis should be placed on the cooperation with stakeholders, highlighting the benefits to their applications.



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## CHANGE IN PROJECT PARTNERS

One of the project partners Muquans has been acquired by iXblue company. Right now the iXblue company is one of the CLONETS-DS project partners, but it's represented by the same people who have worked in CLONETS-DS project from Muquans.

The official list of participants CLONETS-DS project:



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## PUBLICATIONS

The project participants Stefan Schröder, Simon Stellmer and Jürgen Kusche have prepared publication *Potential and scientific requirements of optical clock networks for validating satellite-derived time-variable gravity data* on *Geophysical Journal International* (<https://doi.org/10.1093/gji/ggab132>).

There was also publication on conferences:

- *CLONETS-DS – Clock Network Services-Design study Strategy and Innovation for Clock Services Over Optical-fibre Networks* – Josef Vojtech, et al. on 52nd Annual Precise Time and Time Interval Systems and Applications Meeting,
- *CLONETS-DS: Clock Network Services-Design study Strategy and innovation for clock services over optical-fibre networks* – Radeč Velc, et al. on ACP 2021, paper M5C.5, 25th October 2021



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## FUTURE ACTIVITIES

The CLONETS-DS project has submitted proposal to TNC22 conference (<https://tnc22.geant.org/>).

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## FUNDING

This project receives funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 951886 (CLONETS-DS).

